CONFINED DISPOSAL FACILITY ANALYSIS ACTION ITEMS FROM MAY 8, 2014 EPA/LWG TECHNICAL FEASIBILITY STUDY MEETING

A technical Feasibility Study (FS) meeting was held May 8, 2014, between the U.S. Environmental Protection Agency (EPA) and Lower Willamette Group (LWG). A number of action items pertaining to the existing Terminal 4 (T4) confined disposal facility (CDF) design analysis were developed, including the following:

- Available sediment treatment options associated with the Port of Portland (Port) T4 CDF and the costs associated with these options
- Potential for effluent discharge during filling of the T4 CDF and hence the need for effluent treatment as well as a comparison of assumed Port CDF filling and LWG harbor dredging rates
- Management of the CDF between filling seasons

Each of these three action items is described in more detail in the following sections.

AVAILABLE T4 CDF SEDIMENT TREATMENT OPTIONS

As presented in Section 6.4 of the 60 Percent Terminal 4 Confined Disposal Facility Design Analysis Report (Anchor QEA 2011) there are no predicted adverse effects of groundwater exiting concentrations for the list of key Portland Harbor chemicals of concern (COCs; copper, naphthalene, benzo(a)pyrene, DDx, and Total PCBs). Furthermore, Section 6.4.3 (Anchor QEA 2011) evaluated the groundwater model sensitivity and uncertainty and demonstrated that model predictions are robust to input parameter assumptions and provide further evidence that the CDF will be protective of water quality in the Willamette River. The use of treatment technologies in CDFs is not common—for example, CDFs at Port of Seattle’s Terminal 91, Port of Tacoma’s Milwaukee Waterway and Blair Waterway Slip 1, Port of Everett’s Marine Terminal, Washington State Department of Transportation’s Eagle Harbor, and the St. Paul Waterway did not require treatment of sediment prior to filling.

At the request of EPA, the Port evaluated contingency planning measures in the form of management and engineering controls that could be implemented to enhance the performance of the CDF (if warranted) during CDF construction or in the future as a facility retrofit. Section 5.11 (Anchor QEA 2011) presented the measures evaluated against effectiveness, cost, and implementability. Cost could likely be implemented within the +50/-30 percent level of accuracy of a feasibility-level cost estimate for the CDF. Six different contingency measures were evaluated, as follows:

1. Restrictions on sediment acceptance
2. Amending berm select fill
3. Reducing the size of training dikes
4. Amending dredged sediment during placement
5. Paving the CDF surface
6. Installing a permeable reactive wall in the berm

Contingency measures 2, 4, and 6 involve treatment. Measure 2 would involve mixing an adsorptive material—to help sequester COCs—into the berm material prior to construction. It was concluded that this approach would incur unnecessary costs and logistical complexities during berm construction and was not carried forward. Measures 4 and 6 are further discussed below with more information presented in Section 5.11 (Anchor QEA 2011).

Amending Dredged Sediment During Placement

Dredged sediment placed within the CDF could be amended with an adsorptive material during placement. The adsorptive material used to amend the dredge sediment would be selected based on the COCs that are targeted for reduction, for example granular activated carbon (GAC) to control hydrophobic organic compounds. Adsorptive material could be added prior to or during pumping of mechanically dredged sediment from barges with high-solids pumps into the CDF. Alternatively, adsorptive material could be introduced in-line with sediment that is being hydraulically pumped into the CDF, but would be a more difficult measure to implement. For costing purposes, it was assumed that the dredged sediment would be amended with 0.1 percent GAC. The estimated cost to amend the entire volume of incoming dredged sediment with 0.1 percent GAC was approximately $16 million.

Installing a Permeable Reactive Wall in the Berm

A permeable reactive wall could be added as a retrofit to the existing berm at any point in time after berm and/or CDF construction. The wall would likely be constructed by excavating a trench along the top centerline of the berm alignment and introducing amended slurry. The slurry would prevent the sidewalls from collapsing. Permeable reactive walls are implementable and commonly used. For costing purposes, it was assumed that the permeable reactive wall would be 3 feet thick, vertically span the entire saturated zone of the berm, and laterally extend the full length of the berm and several hundred feet of wing wall along the southern boundary of Slip 1. A distinct advantage of this option is that it can be implemented retroactively after the CDF has been built, and in consideration of post-construction monitoring data, thereby avoiding potentially unnecessary over-engineering during CDF construction. The estimated concept-level costs to build the reactive wall in the berm with 0.1 and 1 percent GAC are $1.8 million and $2.0 million, respectively.

POTENTIAL FOR EFFLUENT DISCHARGE DURING T4 CDF FILLING AND COMPARISON OF ASSUMED DREDGING AND FILLING RATES

Treatment of effluent during the CDF filling process is not required because effluent discharge is not anticipated. As stated in Section 6.3.3 of the 60 Percent T4 CDF Design Analysis Report (Anchor QEA 2011), there will be no significant rise in the pond level of the CDF, and no overflow or effluent discharge to the river during the filling operation. Hydraulic dredging and filling of the CDF is not feasible given that most of the Areas of Potential Concern (AOPCs) are located a long distance from T4 and many are on the opposite bank of the river. It is expected that a majority of the sediments would be mechanically dredged and barged to the CDF. The barged material would then be either mechanically transferred over the berm into the CDF or hydraulically transferred with a high-solids pump using pond water as make-up water.

Figures 5-1 and 5-2 (Anchor 2011) illustrate the CDF and the different CDF layers. The crest of the containment berm (as well as the surrounding existing ground) is at roughly elevation 33 feet National Geodetic Vertical Datum (NGVD). The top of the dredged sediment for confinement is at elevation 9.5 feet NGVD. The mean annual river level is elevation 7.1 feet NGVD. The water level behind the containment berm within the pond is anticipated to be between elevation 7 to 9 feet during filling, depending on conditions. This elevation is roughly 20 to 25 feet below the berm crest.

The offloading facility is expected to be located at the replacement berth constructed at the face of the berm and would likely be sized to offload 2,000 to 4,000 cubic yards (cy) per day. Assuming 100 working days per in-water work season (6 days per week between July 1 and October 31), the maximum quantity of material that could reasonably be offloaded would be 200,000 to 400,000 cy.

The footprint of the CDF is roughly 14 acres. With an anticipated fill rate between 2,000 to 4,000 cubic yards per day (cy/day), this rate would only displace 1 to 2 inches of pond water, significantly smaller than the 20 to 25 feet of capacity.

The Portland Harbor Draft FS (Anchor QEA 2012) assumed a yearly dredging and disposal rate of 230,000 cy. This rate assumed a July 1 to October 31 construction window with three remediation dredge plants removing 700 cy/day per plant. The 230,000 cubic yards per year (cy/year) production rate is at the lower end of the anticipated T4 CDF 60 percent design offloading rate range (200,000 to 400,000 cy/year). This dredging rate would be similar to the level of pond water displacement assumed in the T4 CDF 60 percent design.

Schroeder and Gustavson (2013) presented a more aggressive production rate to be assumed for the FS. They recommended that with a work schedule of 6 days at 24 hours/day with three dredge plants on site, a rate of approximately 5,600 cy/day could be attained. This production rate would result in an annual rate of 560,000 cy/year. LWG (2014) felt that this production rate was overly aggressive based on site-specific information, but would include it in a sensitivity analysis. EPA’s proposed rate would exceed the upper offloading rate range estimated by the Port for the T4 CDF. Thus, with the more aggressive dredging production rate assumptions, the offloading would still be the rate limiting step, with a maximum disposal rate of 400,000 cy/year. Even at EPA’s suggested higher removal rate (5,600 cy/day), the displacement would roughly be 3 inches of pond water. This daily pond level rise would also be significantly smaller than the 20 to 25 feet of capacity.

CDF MANAGEMENT BETWEEN FILLING SEASONS

Depending on the sequencing of Portland Harbor remedial projects and the rate of dredging at these projects, the CDF could be filled in as fast as two seasons or as long as five or more seasons. Section 5.10.5 of the T4 CDF 60 Percent Design Analysis Report (Anchor QEA 2011) describes the filling management measure that would occur between filling seasons. One measure identified was the use of a thin layer of suitable sand placed over the filled sediment as an interim wildlife protection action. When the water depth in the CDF is sufficiently shallow, a thin layer of suitable sand could be placed over the contaminated sediment between filling seasons. During the initial part of the filling operation, such measures would not be necessary due to the significant water depths over the sediment and the initial removal of fish from the CDF following berm closure.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2011. Terminal 4 Confined Disposal Facility Design Analysis Report (Prefinal 60 Percent Design Deliverable), Port of Portland, Portland Oregon. August 2011.

Anchor QEA, 2012. Portland Harbor RI/FS, Draft Feasibility Study. March 30, 2012.

LWG (Lower Willamette Group), 2014. Technical Memorandum to EPA Concerning Proposed Process for Incorporation of EPA's Dredge Production and Dredge Residual Recommendations for the Portland Harbor Feasibility Study. January 15, 2014.

Schroeder, Paul and Karl Gustavson, 2013. Technical Memorandum to EPA Concerning Review and Recommendations on Dredge Duration and Production Rates from the Portland Harbor Draft Feasibility Study. May 27, 2013.